SECTION 03401

PRECAST CONCRETE

PART 1--GENERAL

1.01 DESCRIPTION

This section specifies the materials and labor required for the manufacture and erection of precast concrete including precast boxes, vaults, manholes and other precast structural concrete.

1.02 QUALITY ASSURANCE

A. QUALITY CONTROL BY CONTRACTOR:

1. LABORATORY:

To demonstrate conformance with the specified requirements for cast-in-place concrete, the Contractor shall provide the services of an independent testing laboratory which complies with the requirements of ASTM E329. The testing laboratory shall sample and test concrete related materials as required in Section 03300. Costs of testing laboratory services shall be borne by the Contractor.

2. CERTIFICATION:

The contractor shall provide certification from the precast concrete manufacturer that the materials and manufacturer of precast work supplied conforms to these specifications. The certification shall be signed by an officer of the manufacturer's corporation.

The responsibility for furnishing and installing precast concrete conforming to the specifications is solely that of the Contractor.

3. ENGINEER:

Precast concrete manhole drawings and calculations shall be signed and sealed by a professional engineer who is registered in the State of Florida.

B. REFERENCE STANDARDS:

The appropriate reference standards are specified in specification Sections 03200 and 03300 of this project manual, and the following documents. They are part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Reference	Title

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AASHTO	Standard Specification for Highway Bridges
ACI 318	Building Code Requirements for Structural Concrete
ASTM C443	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C478	Precast Reinforced Concrete Manhole Sections
ASTM C891	Installation of Underground Precast Concrete Utility Structures
ASTM E329	Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction
AWS D1.1	Structural Welding Code – Steel

1.03 SUBMITTALS

In accordance with specification Section 01300 and in addition to the requirements of that section, the following submittals shall be provided:

1. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Construction Manager shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

A. CONCRETE MIX:

Prior to casting any precast elements, concrete mix design shall be submitted to the Construction Manager for acceptance.

B. SHOP DRAWINGS:

Shop drawings shall be submitted showing product location, fabrication details, number identification marks, reinforcement, connection details including field installed anchor sizes and locations, if required, openings, loose or embedded items and inserts, dimensions and relationship to adjacent materials in sufficient detail to cover manufacture, handling, and erection. Shop drawings shall be accompanied by a letter signed and sealed by a Florida registered Professional Engineer, certifying that the shop drawings submitted represent construction which meets or exceeds the requirements of the Contract Documents and the requirements of codes and agencies having jurisdiction over the Work.

1.04 HANDLING AND STORAGE

Unless specified otherwise herein, fabrication, handling and erection of precast elements shall be in accordance with the recommendations made by ACI 318, ASTM C478 and ASTM C891.

Precast elements shall be properly supported off the ground to avoid damage during curing, storage, handling and hauling. Lateral support shall be sufficient to prevent bowing, warping, or permanent set due to creep. Edges of the units shall be adequately protected by padding or other means to prevent staining, chipping or spalling of concrete. Lifting devices shall have a minimum safety factor of 4.

1.05 INSPECTION

The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and review by the Construction Manager. Such inspection may be made at the place of manufacture, or at the site after delivery, or at both places, and the sections shall be subject to rejection at any time for failure to meet any of the Specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. All sections which have been damaged after delivery will be rejected, and if already installed, shall be repaired, or removed and replaced, as directed by the Construction Manager, entirely at the Contractor's expense.

At the time of inspection, the sections will be carefully examined for compliance with the ASTM designation specified below and these Specifications, and with the approved manufacturer's drawings. All sections shall be inspected for general appearance, dimension, "scratch-strength," blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.

Imperfections may be repaired, subject to the approval of the Construction Manager, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance.

PART 2--PRODUCTS

2.01 PERFORMANCE AND DESIGN REQUIREMENTS

A. GENERAL:

Precast concrete manhole bases, barrels and eccentric top sections shall conform to ASTM C478, the detailed drawings, the specifications and the following additional requirements:

1. The minimum wall thickness for the various size barrel sections shall be 8 inches.

2. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section. Each section of the manhole must be inspected and stamped by an accredited testing laboratory.

3. Sections shall be cured by an approved method for at least 28 days prior to coating and shall not be shipped until at least 2 days after coating.

4. Top sections shall be eccentric except that precast concrete slabs shall be used where indicated or where cover over the top of the pipe is less than 4 feet.

5. Unless otherwise noted, precast concrete vaults, boxes and manholes which are installed in, under, or adjacent to paved or unpaved driving surfaces shall be designed to resist AASHTO H20 traffic loading. In areas not subject to traffic loading, cover design live load shall be 300psf.

2.02 PRECAST CONCRETE MATERIALS

A. REINFORCING STEEL:

Reinforcing steel shall be as specified in Section 03200.

B. CONCRETE:

Concrete shall be Class C as specified in Section 03300.

C. GROUT:

Grout shall be as specified in Section 03600.

D. BARREL SECTIONS:

Barrel sections shall have tongue and groove joints. Joints shall have round rubber gaskets set in specially provided indentations. The round rubber "O"-ring gasket shall conform to ASTM C443.

E. COATINGS:

Coatings shall be as specified in Section 09900.

F. EMBEDDED ITEMS AND ANCHORAGE DEVICES:

All embedded items, inserts, and anchorage devices exposed to view, moisture or weather shall be hot-dipped galvanized steel.

G. PENETRATIONS:

All required penetrations and openings larger than 6-inches in diameter or 6-inches square shall be formed in place at the time of casting. Additional reinforcing shall be added where required to meet loading requirements. Openings and penetrations smaller than 6-inches may be core drilled.

H. MOLDS:

Material from which molds are to be fabricated shall be steel, concrete, fiberglass, reinforced plastic or wood. The selection of materials for molds shall be at the manufacturer's option, except that wood shall not be used without the express approval of the Construction Manager. All elements shall be cast in molds of rigid construction, accurate in detail with precise corners and arises, and designed to provide a close control of dimensions and details as indicated on the drawings.

Prior to casting of precast elements, molds shall have all surface joints, radii, corners, etc., filled, ground, filed, straightened or otherwise removed to provide a finished concrete surface that is smooth and dense, free of honeycombing, large air pockets, offsets, sinkages, or other irregularities.

I. PARTING COMPOUND:

All molds shall be coated with parting compound to facilitate removal of elements from molds. Parting compound shall be non-petroleum, nonstaining and shall be of a nature and composition not deleterious to concrete.

2.03 PRODUCT DATA

The following information shall be provided in accordance with Section 01300.

A. MANUFACTURER’S DATA:

Copies of manufacturer’s data shall be provided for the following:

1. Gasket material.
2. Items specified in Sections 03200 and 03300.

B. LABORATORY TEST REPORTS:

Before delivery of materials, reports of the tests specified in Section 03200 and 03300 shall be provided. Test reports on previously tested materials shall be accompanied by the manufacturer's statement that the previously tested material is the same type, quality, manufacture, and make as that proposed for use in this project.

PART 3--EXECUTION

3.01 INSTALLATION

A. GENERAL:

Manholes and other precast structures shall be constructed to the dimensions and details as shown on the Drawings and as specified in this section.

Precast bases shall be set level with the wall's plumb on compacted grade or crushed rock bedding over compacted subgrade.

Precast concrete structure sections shall be set so as to be vertical and with sections in true alignment with a 1/4-inch maximum tolerance to be allowed. The outside and inside joint shall be filled with a comparatively dry mortar (one part cement to two parts sand) and finished flush with the adjoining surfaces. Allow joints to set for 24 hours before backfilling. Interior and exterior coatings shall be applied prior to backfilling. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides. The Contractor shall install the precast sections in a manner that will result in a watertight joint.

Where holes may be cut in the precast sections to accommodate pipes, cutting shall be done prior to setting them in place to prevent any subsequent jarring which may loosen the mortar joints.

B. CASTING:

Casting shall be accomplished by methods and equipment that are in conformance with generally acceptable systems for this type of Work. All precast concrete shall be manufactured by a plant thoroughly experienced in this type of Work. The manufacturer shall meet all production schedules. Surfaces on which units are cast shall be level and free from any imperfections detrimental to the surface appearance of the finished units. Parting compound shall be applied evenly as per manufacturer's recommendations.

C. WELDING:

All weldments shall be made in accordance with the applicable provisions of AWS. All welding, other than tacks, shall be done by certified welders. All units shall be protected from damage by field welding or cutting operations. Noncombustible shields shall be provided as necessary for this purpose.

D. JOINTS AND JOINT SEALANTS:

In all instances, the edges of precast concrete units and of adjacent material shall be sound, smooth, clean and free of all contaminants prior to joint treatment.

Sealant and primer shall be supplied by the same manufacturer and the primer, when required, shall be as recommended for the particular sealant used. All sealant compounds shall be delivered to the job in the manufacturer's original sealed containers with labels intact and shall be applied in strict accordance with the manufacturer's recommendations. Sealant shall be as specified in specification Section 07900 of these specifications.

E. WATERPROOFING:

Unless otherwise noted on the Drawings, exterior surfaces of precast boxes and vaults which are buried shall be waterproofed with epoxy resin specified in Section 09900. Waterproofing may be factory applied, and touched-up in the field prior to backfilling.

3.02 CLEANING AND REPAIRING

After installation, precast elements shall be protected from all damage until final acceptance by the Construction Manager. Precast units with cracks, spalls, and other defects shall be subject to rejection. Units reviewed for repair shall be repaired to the satisfaction of the Construction Manager.

3.03 ALTERNATIVE DESIGN

The General Contractor may offer an alternative design for any precast element. Such design shall be comparable in terms of strength, deflection, finish and all other design criteria indicated. Complete drawings prepared and sealed by a civil or structural engineer registered in the State of Florida where applicable shall be submitted to the Construction Manager for his review in accordance with specification Section 01300 of this project manual. No alternative design will be permitted unless it has been specifically accepted in writing by the Construction Manager. If an alternative design is accepted, all expenses resulting therefrom shall be borne by the General Contractor.

3.04 MANHOLE TESTING

A. GENERAL:

Upon completion of installation, manholes shall be tested. Test shall be either exfiltration or vacuum test, as set out below, at Contractor's option.

B. EXFILTRATION TEST:

Plug all inlets and outlets and fill manhole with water to a height determined by the Construction Manager. Allow filled manhole to stand until it has reached its maximum absorption, but not less than 2 hours. Reestablish head. Measure amount of water required to maintain test head during a 2-hour test period. Leakage as measured by this test shall not exceed 0.1 gallons per hour per foot of manhole diameter per foot of head above manhole invert (or foot of head above groundwater level, if groundwater is above manhole invert).

C. VACUUM TEST:

Upon completion of manhole barrel installation, plug all inlets and outlets and insert rubber ring "donut" type plug in cone opening. Attach vacuum pump to hose connected to plug in cone and apply 4 psi of vacuum (install vacuum regulator on pump such that maximum applied vacuum is 10 psi). After vacuum has stabilized at 3.5 psi for 1 minute, test shall begin. During test period, manhole shall lose no more than 0.5 psi of vacuum. Specified test periods are as follows:

Manhole depth, feet	Test period, min.
0-5	4.5
5-10	5.5
10-15	6.0
Greater than 15	6.5

END OF SECTION